

# A New Species of *Japalura* (Squamata, Agamidae) from the Nu River Valley in Southern Hengduan Mountains, Yunnan, China

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**Abstract** A population of *Japalura* from Yunnan Province, China, previously assigned to *Japalura splendida*, is described as a new species. The new species has been recorded between 1 138–2 500 m in the Nu River drainage between the towns of Liuku and Binzhongluo, and on the lower western slopes of the Nushan and eastern slopes of the Gaoligongshan. The new species can be distinguished from other species of *Japalura*, except *J. dymondi*, by the following combination of characters: exposed tympani, prominent dorso-lateral stripes, and small gular scales. It is very similar with but differs from *J. dymondi* by having smooth or feebly keeled dorsal head scales, three relatively enlarged spines on either side of the post-occiput area, strongly keeled and mucronate scales on occiput area and within the lateral stripes, back of arm and leg green, higher number of dorsal-ridge scales (DS) and fourth toe subdigital scales (T4S). A principal component analysis of body measurements of adult male specimens of the new species and *J. dymondi* showed principal component 1 loading highest for upper arm length, fourth toe length and snout to eye length and principal component 2 loading highest for head width, head length and fourth toe length.

**Keywords** Agamidae, *Japalura* sp. nov., Gaoligongshan Mountain, Nujiang River Valley, Hengduan Mountains, Yunnan, China

## 1. Introduction

Of the 32 known species of *Japalura*, 18 occur in continental China (Wang *et al.*, 2015; Wang *et al.*, 2016). Of these, ten (*J. dymondi*, *J. flaviceps*, *J. laeiventris*, *J. iadina*, *J. vela*, *J. yulongensis*, *J. breviceuda*, *J. szechwanensis*, *J. splendida*, *J. varcoae*, and *J. yunnanensis*) occur in Yunnan Province of southwestern China. Meanwhile, the populations of *Japalura* within the Nu (Salween) River Valley drainage system, between the towns of Liuku, Liushu County, and Bingzhongluo, Gongshan County, Yunnan Province, have previously been assigned to *J. splendida* (Yang *et al.*, 1983, Zhao

*et al.*, 1999). New collections made along the Nu River Valley (Figure 1) by D. Q. RAO and D. T. YANG, as well as subsequent collections made by the China Natural History Project (a collaborative project between the Kunming Institute of Zoology (KIZ), the Kunming Institute of Botany (KIB) and the California Academy of Sciences (CAS)) and the NSF-funded Gaoligongshan Project (also a collaborative project between KIZ, KIB, and CAS) revealed that the lizards formerly thought to be *J. splendida* represent a new species.

## 2. Materials and Methods

Specimens were hand collected from the Nu River Valley in 1973, 1997, 2000, 2002, 2004 and 2005. They were subsequently euthanized, fixed in 10% buffered formalin and transferred to 70% ethanol. Latitude, longitude and elevation were recorded for specimens collected between 2000–2005 using a Garmin 12 GPS receiver (datum WGS 84).

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The following measurements were obtained for specimens of the new species and *Japalura dymondi*: snout-vent length (SVL), distance from tip of snout to anterior edge of vent; head length (HL), distance from tip of snout to rear border of right angle of the jaw; head width (HW), widest point in the temporal region, anterior to the tympanum; interorbital distance (IOD), distance between outer edges of superciliary series; snout to eye length (SEL), distance from tip of snout to anterior margin of eye; upper arm length (UAL), distance from axilla to elbow; lower arm length (LAL), distance from elbow to the posterior edge of palm of right hand; hand length (HandL), distance from the posterior edge of palm of right hand to end of fourth finger (to base of claw); upper leg length (ULL), distance from groin to knee; lower leg length (LLL), distance from knee to heel; foot length (FL = FootL), distance from heel to distal end of fourth toe (to base of claw); fourth toe length (4thToeL), distance from the juncture of the third and fourth toes to the base of the claw on the right foot; tail length (TailL), distance from tail tip to posterior border of vent (“+” indicates an incomplete tail); right hind limb length (HLL); tibia length (TibiaL), distance from the base of heel to knee on left leg.

Data for the following meristic characters were recorded: supralabials (SupL = SL), number of enlarged scale bordering left margin of upper lip (not including rostral scale); infralabials (InfL = IL), number of enlarged scales bordering the left margin of lower lip (not including mental scale); dorsal crest scales (DC), enlarged mid-dorsal crest scales from just posterior to occiput to above the anterior margin of the vent; dorsal-ridge scales (DS), including DC; number of fourth toe subdigital scales (4thToeSL = T4S), including distal most scale on claw base.

Measurements, except for TailL, were made with digital calipers with a 0.1 mm precision and rounded to the nearest 0.1 mm. Tail length was measured using a measuring tape with a precision of 1 mm. Scale counts and observations of external morphology were made using a dissecting microscope.

Principal components analysis (PCA) was applied to 9 specimen measurements (SVL, HL, HW, HLL, TailL, TibiaL, 4thToe, SupL, and InfL) of 18 adult male *Japalura* from the Nu Valley and 20 adult male *J. dymondi* from the Yangtse River Valley, Da-Yao County, Yunnan Province (Table 1). All measurements were log-transformed. Statistical analyses were performed using Stata/SE 8.2 for Linux. A MANOVA and discriminant analysis was performed to test for significant differences between the

**Table 1** Loadings for the first two principal component axes for 18 male *Japalura slowinskii* sp. nov. and 20 male *J. dymondi*.

Variable	Eigenvectors	
	Component1	Component2
SVL	0.17066	0.31689
HL	0.1865	0.45849
HW	0.14983	0.46952
IOD	0.18751	0.30542
SEL	0.34883	0.2715
UAL	0.32532	0.03411
LAL	0.43406	-0.2698
HandL	0.3375	-0.22821
ULL	0.26205	0.05713
LLL	0.24312	-0.02333
FootL	0.30515	-0.17752
4thToeL	0.35742	-0.37492



**Figure 1** Map of western Yunnan Province, China, illustrating the distribution of *Japalura slowinskii* sp. nov. Star represents the type locality. number 1 represent the Nujiang River, number 2 represent Lancang River, number 3 represent Jinsha River.

groups. Museum codes follow Leviton *et al.* (1985). The codes JBS and GLGS are followed by the field numbers for Joseph B. SLOWINSKI and the Goaligongshan project, respectively. JBS and GLGS specimens will be deposited in the collections of CAS and KIZ.



### 3. Results

#### *Japalura slowinskii* sp. nov.

**Holotype** KIZ2000R0608 (JBS16231) (Figures 2–5), adult male, from a small village S of Fugong (County), along Nu River, 26°48'44.0"N, 98°53'10.7"E, ca.1138m elevation, Nujiang Prefecture, Yunnan Province, collected by D.Q. RAO and Joseph B. SLOWINSKI on 14 July, 2000.

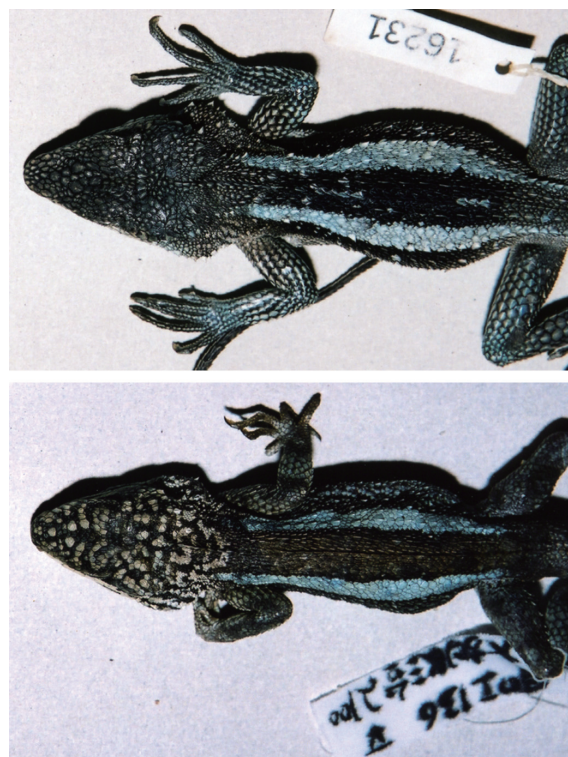
**Paratypes** All from China, Yunnan Province, Nujiang Prefecture, KIZ-JBS 04233, 04235, 04237, 16133-34, 16137, 16254, CAS214971-73, 214989-215003, 215053, data as for holotype, except CAS214971-73 were collected on July 2000; CAS 214906 from a small village N of Gongshan (County) on E bank of Nu River, 27°48'21.4"N, 98°41'03.9"E, ca.1509m elevation, Nujiang Prefecture, Yunnan Province, collected by D.Q. RAO and Joseph B. SLOWINSKI on 8 July, 2000; CAS 214951-52, 214954 from Fugong along Nu River, 26°54'31.9"N, 98°51'59.8"E, ca.1206m elevation, Nujiang Prefecture, Yunnan Province, collected by D. Q. RAO and Joseph B. SLOWINSKI on 11 and 12 July, 2000 respectively; CAS 215053 from near town of Luzhang, on eastern slope of Gaoligongshan, 25°56'47.2"N, 98°46'10.2"E, ca.2139m elevation, Nujiang Prefecture, Yunnan Province, collected by D.Q. RAO and Joseph B. SLOWINSKI on 22 July, 2000; CAS 228178 from along Fugong-Liuku road, E side of Nu River, 26°50'42.9"N, 98°52'42.9"E, ca.1231m elevation, Nujiang Prefecture, Yunnan Province, collected by D. Q. RAO and J. A. WILKINSON and J. V. VINDUM, on 10 October, 2002.

**Diagnosis** A large species of *Japalura* with a robust head and body compressed dorso-ventrally; SVL =  $89.6 \pm 5.44$  mm ( $n = 18$ ; Male); SVL =  $83.9 \pm 6.71$  mm ( $n = 7$ ; Female); smooth or feebly keeled dorsal head scales; exposed tympani; a transverse gular fold; a distinct oblique fold anterior to shoulder extending dorsally from transverse gular fold and continuing posteriorly beyond shoulder; dorsal scales heterogeneous, larger scales strongly keeled; a broken dorso-lateral row of enlarged and strongly keeled scales separated from dorsal crest scales by one large or two smaller scales, and separated from each other by one or two small scales; tail in adult males slightly swollen posterior to base; dorsum of males black with a turquoise dosolateral stripe on either side of mid-dorsal crest: fore and hind limbs green.

**Description of holotype** Adult male; SVL 95.3 mm, TailL 231 mm (see Table 2 for additional measurements). Habitus, stout, compressed dorso-ventrally. Snout tapering, rounded at tip; rostral 4.9 mm wide and 1.7 mm



**Figure 2** *Japalura slowinskii* sp. nov. (above) and *Japalura dymondi* (below) in life.

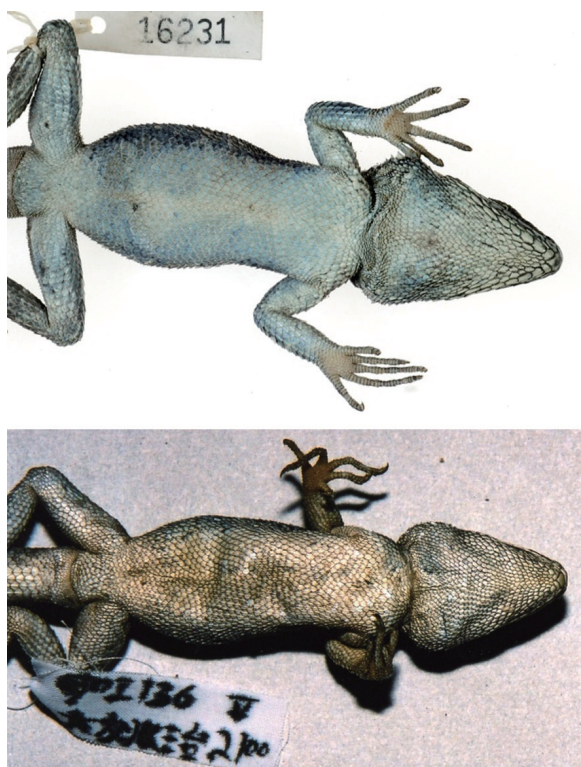


**Figure 3** Dorsal view of *Japalura slowinskii* sp. nov. (above) and *Japalura dymondi* (below).

high, bordered by four postrostral scales, two prenasals (one on each side) and first supralabials; supralabials seven, smooth; scales posterior to nasals smooth, forming two longitudinal rows above supralabials, extending to



**Figure 4** Lateral view of *Japalura slowinskii* sp. nov. (above) and *Japalura dymondi* (below).



**Figure 5** Ventral view of *Japalura slowinskii* sp. nov. (above) and *Japalura dymondi* (below).

posterior margin of orbit on left side and anterior margin of orbit on right, becoming irregular posteriorly and extending to posterior margin of supralabials; scales on dorsal and lateral surfaces of head heterogeneous, irregularly arranged; scales in internasal, frontal, and supraocular regions smooth; scales on posterior portion of head smooth, feebly keeled or slightly rugose; three slightly enlarged spinose scales between tympanum and nuchal crest; superciliaries imbricate, overlapping by

one-third or more; scales around eye small, granular; tympani exposed; orbit 3.2 and 2.7 times diameter of tympanum (left and right, respectively); cheeks swollen, extending 2.7 mm beyond widest point of head in temporal area; mental pentagonal, smooth,  $3.3 \times 3.0$  mm, bordered by first infralabials, two postmentals, and a small scale at posterior apex of mental separating postmentals; postmentals followed by five and seven enlarged chin shields (left and right, respectively); chin shields narrower posteriorly, first three left chin shields separated from infralabials by one scale row, first two right chin shields separated from infralabials by one scale row; gulars strongly keeled, imbricate, mucronate, less so anteriorly; transverse gular fold with feebly keeled, slightly mucronate, imbricate scales; distinct oblique fold extending dorsally from gular fold anterior to shoulder and continuing posteriorly as a longitudinal fold; gular pouch inconspicuous.

Dorsal-ridge (middorsal) consisting of 44 strongly keeled scales, Dorsal crest (nuchal crest) comprised of anterior 11 scales, enlarged, laterally flattened, almost as broad as high, larger than posterior middorsal crest scales; a broken longitudinal row of enlarged strongly keeled scales parallel to dorsal crest, separated from one another by one or two small, keeled, scales, and separated from mid-dorsal crest by one large or two small scales; dorsolateral scales heterogeneous, with strongly keeled, imbricate, and mucronate large scales, and feebly keeled, imbricate and mucronate small scales; ventral flank scales less heterogeneous, strongly keeled, imbricate, and mucronate; ventral scales of similar size, almost as large as largest dorsal scales, strongly keeled, imbricate, mucronate, in longitudinal rows; groin scales small; forelimbs with imbricate, feebly keeled scales, slightly mucronate, dorsal scales less keeled; length of fingers (right hand): I = 4.5 mm, II = 8.2 mm, III = 11.6 mm, IV = 12.3 mm, V = 7.2 mm; subdigital lamellae of fingers bicarinate, right fourth finger with 23 lamellae (including last scale on claw base); scales on dorsal surface of thigh and dorsal and ventral surfaces of lower leg imbricate, feebly keeled, some mucronate; ventral surfaces of thigh slightly imbricate; scales on posterior portion of thigh keeled, non-imbricate, slightly imbricate toward ventral surface; toe lengths (right foot): I = 5.5 mm, II = 8.6 mm, III = 16.6 mm, IV = 18.2 mm, V = 12.8 mm; toe subdigital lamellae bicarinate, right fourth toe with 27 lamellae (including last scale on claw base); tail round in cross-section, with large, strongly keeled, mucronate, scales arranged in longitudinal rows; scales of tail larger than dorsal or ventral body scales; tail base slightly



swollen. Posterior half of parasitic worm extruding from right orbit.

**Color in life of holotype** Snout and canthus rostralis brown, brownish gray on back of head extending laterally to below orbit and tympanum. Most head scales with black borders. Upper and lower labials and scales bordering labials cream with black borders. Middorsum dark brown with irregular pattern of blue gray scales. Blue gray dorso-lateral stripes on either side of dorsal crest, extending from nape to base of tail. Flanks dark brown with irregular pattern of blue gray scales. Upper arms green, green from above the elbow to the digits. Smaller scales at the insertion of the femur brown, upper thighs gray green, brown from below knees and onto dorsal surface

of feet and digits. Chin and gular region cream. Venter with cream mid-ventral stripe, ventral cream coloration increasingly blue toward flanks. Ventral surface of hands cream, feet slightly darker. Tail brown with darker brown bands, ventral surface lighter (Figure 6).

**Variation** Body measurements and meristic characters for the holotype and CAS paratypes are presented in Tables 2–3. Upper head yellowish green, scales with black borders. Loreal region with light brownish cream scales. Eyelids yellowish green; iris yellow (outer edge) and brown (inner edge). Upper and lower labials and bordering scales whitish, scales bordered with black. Temporal area light brownish cream above and dark brown below. Gular region gray. Area above shoulders



**Figure 6** The male (A, B, and C) and the female (D, E, and F) of *Japalura slowinskii* sp. nov. in life. Images not to scale. Photos by Hong HUI.

**Table 2** Body measurements (including average and range) for the holotype (KIZ) and CAS paratypes of *Japalura slowinskii* sp. nov. (+ indicates incomplete tail).

CAT No.	Sex	SVL	TailL	HL	HW	IOD	SEL	UAL	LAL	HandL	ULL	LLL	FootL	4thToel
CAS214992	F	74.8	191	23.7	14.6	11.5	9.6	13.6	14	14.1	19.8	17.4	25.7	16.6
CAS214997	F	77.4	191	23.6	15.4	12	10.2	13.3	10.7	12.4	19.3	17.3	23.5	15.1
CAS214995	F	80.7	191	24.9	14.7	11.8	9.1	15.2	14.2	13.9	20.4	18.7	25.5	16.6
CAS215001	F	83.4	199	23.7	15.6	11.9	11	13.8	14	15.9	21.3	18.8	27.3	18
CAS215003	F	87.7	219	26.5	16.1	12.7	11.1	14.3	15.5	15	19.9	19	24.5	16.4
CAS214999	F	91.6	221	28.5	17.7	14.3	11.3	15.9	15.7	17.3	22.4	21.4	30.3	19.3
CAS215000	F	91.7	217	28	18.1	14.5	10.6	14.1	14.5	16.2	21.9	18.7	26.6	17.5
Average		83.9±6.71	204±14.23	25.6±2.11	16±1.38	12.7±1.24	10.4±0.82	14.3±0.93	14.1±1.65	15±1.65	20.7±1.17	18.8±1.36	26.2±2.20	17.1±1.34
Range		74.8–91.7	199.0–221.0	23.6–28.5	15.6–18.1	11.5–14.5	9.6–11.3	13.3–15.9	10.7–15.7	12.4–17.3	19.3–22.4	17.3–21.4	23.5–30.3	15.1–19.3
CAS214991	M	81	208	24.4	16.7	11.8	9.9	12.1	14.3	15.6	21.5	18.6	28	17.7
CAS214989	M	82	209	27.1	17.2	13.1	10.4	14.7	13.9	16.2	21.5	19.6	27.8	18.8
CAS214954	M	82.6	139+	26.7	17.3	13.7	10	13.1	16	16.6	22.1	20.3	28.9	18.8
CAS214906	M	82.9	200	27	17.1	12.6	11	14.6	15.1	15.5	21.3	20.1	27.4	18.3
CAS214972	M	85.1	201	25.5	16.5	12.5	10.9	13.9	14.8	15.1	21.2	19.3	25.3	16.7
CAS214996	M	86.7	195	25.9	16	12.8	10.8	13.8	14.3	15.8	20	19	28.6	18.4
CAS215002	M	87.2	222	28.4	17.7	13.3	10.3	15.2	15.7	17.6	22.3	19.9	31.3	20.1
CAS214990	M	88.5	221	27.6	17.7	13.1	10.5	15.3	15.6	16.7	22.8	19.7	29.8	18.8
CAS214973	M	88.8	222	29.7	18.1	13.8	11.9	14.6	16.8	18.5	22.5	20.3	29.8	20.6
CAS214993	M	89.9	213	27.9	16.8	12.9	11.1	14.3	16	17.5	21.2	19.5	28.3	18.8
CAS228178	M	91.3	133+	26.9	17.3	13.9	10.4	15.5	16.2	14.6	23.5	20.1	26.5	16.9
CAS214951	M	93.5	228	31	19.9	14.2	11.8	15.3	16	17.6	21.5	21.2	29.1	18.7
CAS214998	M	94.1	237	31.1	20.3	14.6	11.6	16.3	17.3	18.6	24.2	21.7	32.6	21.6
CAS215035	M	94.4	209	29.9	18	14.2	12.2	15.8	16.5	17	24.4	20.3	27.2	17.8
KIZ2000R0608	M	95.3	231	32.6	20.5	14.6	13.8	14.7	16.8	16.6	23.2	20	29.6	18.2
CAS214994	M	95.5	242	32.9	20.1	14.9	13	16.4	16.3	17.7	23.1	21	30.7	20
CAS215053	M	95.6	239	29.4	18.7	14.3	12.6	15.6	15.7	17.8	23.2	20.7	30.3	19.8
CAS214971	M	98.3	242	32.7	20.5	14.2	13.5	16.3	16.7	19.5	24.6	22.6	30.7	18.9
Average		89.6±5.44	220±15.56	28.7±2.59	18.1±1.49	13.6±0.86	11.4±1.20	14.9±1.14	15.8±0.96	16.9±1.31	22.5±1.27	20.2±0.97	29±1.82	18.8±1.24
Range		81.0–98.3	200.0–242.0	24.4–32.7	16.7–20.5	11.8–14.9	9.9–13.8	12.1–16.3	13.9–17.3	15.1–19.5	20.0–24.6	18.6–22.6	25.3–32.6	16.7–21.6

with a slight reticulated pattern of gray, light and dark brown. Nape and nuchal crest yellowish green. Mid dorsum black becoming green above pelvic region; broken longitudinal row of enlarged scales parallel to dorsal crest torquoise. Lateral stripe torquoise edged with green scales. Flank below lateral stripe black or dark brown becoming light brown ventrally. Venter gray. Limbs, hands and feet green, scales bordered with black, anterior edge of limbs light greenish gray. Dorsal tail greenish brown at base becoming grayish brown with darker bands distally. The coloration in life of GLGS 2560 (female) based on digital photograph. Larger scales of upper head light green, small scales black. Labials whitish yellow with black borders. Area below tympanum whitish-yellow with two black diagonal irregular stripes below tympanum. Middorsum black, interspersed with light green scales giving a pattern of five weak irregular transverse bands. Lateral stripe irregular, larger scales light green with smaller black scales interspersed, edges irregular. Flanks below lateral stripe reticulated with green and black (more so anteriorly), lower flank scales white. Scales on upper surface of limbs, hands and feet light green with black borders. Tail light green at base with whitish gray bands and three dark gray saddle-like, distally whitish gray and dark gray bands.

**Comparisons** *Japalura slowinskii* differs from other *Japalura* species except *J. dymondi*, *J. kaulbacki*, *J. kumaonensis*, *J. major*, *J. tricarinata* and *J. varcoae* by having exposed tympani. Among *Japalura* with exposed tympani, *J. slowinskii* differs from *J. kumaonensis*, *J. major*, *J. tricarinata*, *J. varcoae*, *J. laeviventris*, *J. iadina*, *J. vela*, *J. yulongensis*, *J. brevicauda*, and the *J. flaviceps* complex by its male having a prominent green dorso-lateral stripe on either side of the mid-dorsal crest (Smith, 1935); differs from *J. kaulbacki* by lacking enlarged gular scales (Smith, 1940).

*Japalura slowinskii* is most similar in appearance to *J. dymondi* (character states in parentheses), but differs by having smooth or feebly keeled dorsal head scales (strongly keeled or rugose), scale row above upper labials white with horizontal black edges (black), three relatively enlarged spines on either side of the post-occiput area (spines reduced), more strongly keeled and mucronate scales on occiput (few and slightly keeled and mucronate), scales within the lateral stripes strongly keeled and mucronate (weakly keeled, rounded and slightly mucronate), back of arm and leg green (brown), relatively more number of dorsal-ridge scales (DS, 36-51 [mainly 41-51] vs 37-39 in measured males) and fourth toe subdigital scales (T4S, 24-30 vs. 19-23) (see Table

4-5).

In the PCA analysis, principal component 1 (PC1) accounted for 73.19% of the variance and PC2 for 10.49%. PC1 loaded highest for UAL, whereas PC2 loaded highest for HW, HL, and 4thToeL (Table 1). MANOVA was significant (Wilks'  $\lambda = 0.08$ ,  $P < 0.0001$ ). A subsequent discriminant analysis assigned specimens to the correct species with 100% accuracy.

**Etymology** The specific epithet is a patronym honoring our late friend and colleague Joseph Bruno SLOWINSKI. The epithet is a masculine noun in the genitive case. Dr. Joseph B. SLOWINSKI worked in CAS until his death on September 11, 2001 in north Myanmar a bite from a krait during a field expedition at the age of 38 years old, when he was in charge of both the projects of Myanmar Biodiversity Survey, and the China Natural History Project — the NSF-funded Gaoligongshan Project (collaborative project between KIZ, KIB, and CAS).

**Distribution and Natural History** *Japalura slowinskii* has only been found within the Nu River Valley drainage system between the town of Liuku, Lushu County, and the town of Binzhongluo, Gongshan County, a north-south distance of approximately 210 km (refer to Figure 1). The species has been found on the western slopes of the Nu Shan and the eastern slopes of the Gaoligongshan between elevations of 1 138–2 500 m. *J. slowinskii* has not been recorded on the eastern slopes of the Nushan or the Hengduan Shan, or on the western slope of the Gaoligongshan; however, these areas have not been thoroughly surveyed for reptiles. It is unlikely that the species extends beyond the western slopes of the Gaoligongshan because of the high altitude of the ridge (above 3 000 m [Chaplin, 2005]). A recent collecting trip (2005) to Dulong Valley, west of the Gaoligongshan ridge, only recorded a single agamid species, *Pseudocalotes kindonwardi*.

*Japalura slowinskii* inhabits agricultural and farm bush areas, as well as secondary forest. The species is commonly seen basking on vertical earthen walls, rocky cliffs, or talus slopes with large rocks. When frightened the species seeks refuge in wall or rock crevices. *Japalura slowinskii* has not been found in sympatry with other species of *Japalura*. The nearest congeners are *J. yunnanensis* which ranges further south along the China-Myanmar border in western Yunnan Province, and *J. dymondi* which is restricted to the Yantzee River Valley in southern Szechuan Province and north-central Yunnan Province (Zhao, 2002). Other agamids within the distribution of *J. slowinskii* include *Calotes mystaceus*, *C. emma*, and *C. versicolor*, all of which range north

**Table 3** Measurement of *Japalura dymondi*.

CAT No.	SEX	SVL	TailL	HL	HW	IOD	SEL	UAL	LAL	HandL	ULL	LLL	FootL	4thToeL
901009	M	86.1	113.4+	28.4	18.6	12.3	10.2	13.6	15.9	14.7	19.8	18.5	25.5	16.4
901008	M	79.5	166.4	25.7	16.4	11.5	9.3	11.7	11.8	14.5	18.4	17.8	25.2	15.5
901012	M	84.9	98.1+	27.3	18.5	12.5	9.7	13.2	14.3	15	20.1	19	24.8	16.9
901025	M	80.5	172.9	25.9	16.4	11.4	9.6	11.4	11.5	13.3	18.9	17.1	23.4	14.9
901003	M	88.9	128.9+	28.9	17.5	12.7	10.3	13.9	12.3	16.2	20.4	19.1	26.2	16
901004	M	86.5	134.0+	28.4	17.6	13.3	10.2	12.7	12.3	13.7	17	17.1	24.5	14.4
901002	M	80.1	158.3	28.6	17.6	13.1	9.8	12.3	12.1	15.8	21.3	18.9	25.5	16
901007	M	86.2	200.1	29.1	19.3	14.2	9.8	13.4	11.9	15.1	20.7	17.6	26	15.8
901019	M	89.6	98.1+	29.7	19.1	13.9	10.2	12.8	13.1	12.1	20.3	18.3	25.3	16.2
901024	M	86.7	194.1	27.2	17.6	13	9.8	11.3	11.2	14.6	22.1	17.5	23.5	14.8
901017	M	86.8	118.5	27.7	19	12.1	9.9	13.1	14.5	14.3	21	19.5	24.9	14.7
901046	M	77.9	170.1	26	16.7	12.2	8.9	11	12	14.3	18.8	16.3	22.9	15.2
901014	M	82	163.5	26.2	17.3	12.2	9	13.3	12.7	12.6	18.5	17.7	22.8	14.6
901006	M	95.5	103.1+	30.6	20.2	13.3	10.7	13.4	13.7	15.2	21.5	19.5	25.3	15.9
901001	M	93.4	177.3	30.8	18.9	13.8	10.8	13.3	12.7	15.5	21.5	18.7	26.9	16.4
901016	M	83.6	158.3	27.6	17.2	13.2	10.3	13	12.7	15.4	19.8	18.2	25.6	16.4
901018	M	88.2	167	27.5	18.2	13.1	10	14	11.7	13.4	20.4	18	25	14.5
901020	M	86.7	179.5	26.9	18.2	13.4	10.1	13.2	13	14.4	21.6	18.8	26.1	15.8
901015	M	80.8	169.6	27	17.8	12.9	9.6	14.3	13.1	14.4	18.9	17.8	26.2	16.7
901029	M	80.3	163	25.4	15.7	11.7	8.8	13.1	11.6	14.7	18.4	17.4	24.3	14.8
Average		85.21±1.04	151.71±7.06	27.74±0.34	17.89±0.25	12.79±0.17	9.85±0.12	12.9±0.20	12.7±0.26	14.46±0.23	19.97±0.30	18.14±0.19	24.99±0.25	15.59±0.17
Range		77.9–95.5	98.1–200.0	25.4–30.8	20.2–15.7	11.4–13.9	8.8–10.8	11.0–13.9	11.2–15.9	12.6–16.2	18.4–21.6	17.1–19.5	23.4–26.9	14.4–16.9



**Table 4** Meristic characters for the holotype (KIZ) and CAS paratypes of *Japalura slowinskii* sp. nov.

CAT No.	SEX	SL	IL	DC*	DS*	T4S
CAS 214992	F	8/7	8/7	--	42	27
CAS 214995	F	7/7	9/7	--	44	25
CAS 214997	F	7/8	8/8	--	52	26
CAS 214999	F	8/8	8/8	--	50	25
CAS 215000	F	7/8	8/8	--	51	28
CAS 215001	F	8/7	8/9	--	45	26
CAS 215003	F	8/8	9/9	--	52	24
Average		7.57±0.51	8.14±0.66		48±4.20	25.9±1.35
Range		7–8/7–8	8–9/7–9		42–52	24–28
KIZ 2000R0608	M	7/7	8/7	11	42	27
CAS 214906	M	7/7	8/7	--	50	24
CAS 214951	M	8/9	8/8	--	43	26
CAS 214954	M	8/8	10/10	--	50	27
CAS 214971	M	7/8	8/8	--	42	26
CAS 214972	M	8/8	9/10	--	47	23
CAS 214973	M	7/6	8/8	--	45	26
CAS 214989	M	8/8	9/9	--	43	27
CAS 214990	M	8/8	8/9	--	48	30
CAS 214991	M	7/7	9/8	--	49	27
CAS 214993	M	7/7	7/10	--	52	28
CAS 214994	M	8/9	8/8	--	36	28
CAS 214996	M	6/7	8/9	--	42	25
CAS 214998	M	7/7	8/8	--	41	27
CAS 215002	M	7/7	8/8	--	47	29
CAS 215035	M	8/8	8/7	--	49	25
CAS 215053	M	8/7	8/8	--	47	28
CAS 228178	M	7/8	8/8	--	44	28
Average		7.47±0.70	8.28±0.81		45.4±4.07	26.7±1.74
Range		6–8/7–9	7–10/7–10		36–51	24–30

\*DC=Dorsal Crest Scales; DS = Dorsal-ridge Scales of Body.

**Table 5** Meristic characters for *Japalura dymondi*.

CAT No.	SL	IL	DC*	DS*	T4S
90I009	7/8	8/8	8	38	22/21
90I008	9/8	9/9	7	37	21/22
90I012	9/8	8/8	7	37	21/23
90I025	9/9	9/8	7	37	21/22
90I003	8/9	9/9	7	38	22/23
90I004	8/9	7/8	7	37	21/22
90I002	8/8	9/9	7	38	22/23
90I007	8/7	9/10	8	38	22/23
90I019	8/8	9/8	9	39	21/22
90I024	8/7	8/8	7	37	21/22
90I017	7/7	7/8	9	39	22/23
90I046	8/8	8/9	7	37	22/23
90I014	8/8	9/10	8	38	20/23
90I006	8/6	9/9	8	38	19/20
90I001	9/9	9/9	7	37	22/22
90I016	8/8	8/8	7	38	22/21
90I018	8/9	10/10	8	38	21/23
90I020	7/8	9/9	7	38	22/22
90I015	8/8	8/8	8	38	23/21
90I029	9/8	8/9	7	37	21/21
Average	8.05±0.11	8.6±0.11	7.5±0.15	37.7	21.75±0.15
Range	7–9/7–9	7–10/8–10	7–9	37–39	19–22/21–23

\*DC=Dorsal Crest Scales; DS = Dorsal-ridge Scales of Body.

along the Nu River Valley and its tributaries to the Liuku area (the southern range of *J. slowinskii*). In the north, *J. slowinskii* is sympatric with *Pseudocalotes kakhienensis* in the areas near the towns of Fugong, Gongshan and Binzhongluo.

**Remarks** We acknowledge that the genus *Japalura* has been shown to be paraphyletic (Macey *et al.*, 2000, Schulte *et al.*, 2004); however, until the phylogenetic relationships within the genus are resolved, we place this species in the unresolved, paraphyletic, clade of *Japalura*.

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## Appendix I

### Specimens Examined

Geocoordinates in brackets were added retrospectively and should not be considered original data supplied by the collector(s).

***Japalura dymondi*:** BMNH 1914.3.2.2-3, Wuting Chou, Yunnan; KIZ 90I001-08, 90I010, 90I012-26, 90I028-29, 90I031-40, 90I042-50, 90I052-54, 90I056-58, Duo-Di-He Village, near Jinsha River (Yangtse River), San-Tai Township, Da-Yao County, 2,100 m.

***Japalura batangensis*:** CAS 64275-76, China, Szechwan Province, Batang.

***Japalura major*:** BMNH 1953.1.1.50 Chadhabise, Khola, W. Nepal, 3,049 m; BMNH 1953.1.1.48 Samela, W. Nepal, 2,287 m.

***Japalura planidorsata*:** CAS 233211, Myanmar, Chin State, Haka Township, Chun Kyone village, 22 48 38.5 N, 93 33 28.9 E; CAS 233296, Myanmar: Chin State, Falam Township, Liava village, 22 50 53.5 N, 93 32 48.8 E.

***Japalura slowinskii***, sp. nov.: All from China, Yunnan Province, Nujiang Prefecture. KIZ 97R10001-4, 97R10006-9, 97R10011-17, 97R10036, 97R10038-51, 97R10053-54, 97R10056-57, 97R10059, 97R10061, Zhiziluo Village (previously Bijiang town), Fugong County [26° 33' 00" N, 98° 55' 59" E]; GLGS 2897, rd between Gongshan and Dulongjiang, 27° 46' 38.1" N, 98° 35' 18.9" E, 2,160 m; GLGS 2898, rd between Gongshan and Dulongjiang, 27° 46' 23.5" N, 98° 39' 51.8" E, 1,686 m; GLGS 2899-2901, rd between Gongshan and Dulongjiang, 27° 46' 22.4" N, 98° 39' 17.3" E, 1,659 m; GLGS 2903, rd between Gongshan and Dulongjiang, 27° 46' 35.1" N, 98° 36' 57.5" E, 1,910 m; GLGS 2904, rd between Gongshan and Dulongjiang, 27° 46' 17.9" N, 98° 38' 35.0" E, 1,733 m; GLGS 2905-08, rd between Gongshan and Dulongjiang, 27° 46' 46.5" N, 98° 36' 38.5" E, 1,940 m; GLGS 2914, rd between Gongshan and Dulongjiang, 27° 46' 55.6" N, 98° 35' 36.5" E, 2,144 m; GLGS 2915-18, rd between Gongshan and Dulongjiang, 27° 46' 47.7" N, 98° 36' 40.5" E, 1,953 m; GLGS 2919-21, rd between Gongshan and Dulongjiang, 27° 46' 19.3" N, 98° 38' 58.8" E, 1,947 m; GLGS 2941, rd between Gongshan and Bingzhongluo, 27° 51' 11.3" N, 98° 41' 17.3" E, 1,610 m; GLGS 2942, rd between Gongshan and Dulongjiang, 27° 46' 22.9" N, 98° 39' 02.3" E, 1,688 m; GLGS 3192-99, 3201-04, 3206-15, vicinity of village S of Gongshan, 27° 42' 13.1" N, 98° 42' 10.6" E, 1,437 m; GLGS 2560-63, 2617-23, 2640, 2643-45, 2678-82, Shilajia, 27° 07' 45.3" N, 98° 49' 54.8" E, 1,695 m; GLGS 2584-85, Dawan, 27° 07' 08.6" N, 98° 49' 51.4" E, 1,705 m; GLGS 2654, Shiwuli, 27° 09' 22.5" N, 98° 47' 57.4" E; KIZ 78II003, 78II0048-50, 78II0060, 78II0070, Zhi-zi-luo, Pihe, Fugong [26° 33' 00" N, 98° 55' 59" E], 2,350 m; KIZ 78II0051-54, Zhi-zi-luo Pihe, Fugong [26° 33' 00" N, 98° 55' 59" E], 2,350-2,500 m; KIZ 78II0071, 78II0076-77, 78I078, 78I081, Pihe, Fugong [26° 31' 48" N, 98° 54' 00" E], 1,800 m; KIZ 78I010, 78II0068, Zhi-zi-luo Pihe, Fugong [26° 33' 00" N, 98° 55' 59" E], 2,500 m; KIZ 78II0004, Zhi-zi-luo Pihe, Fugong [26° 33' 00" N, 98° 55' 59" E], 2,000 m; KIZ 730047-49, Pula, Gongshan [27° 47' 42" N, 98° 35' 24" E], 1,750 m; KIZ 730083, 730088, Gongshan town [27° 40' 59" N, 98° 36' 59" E], 1,500 m; KIZ 730100, Qi-qing, Gongshan [27° 43' 15.6" N, 98° 34' 12" E], 1,980 m; KIZ-JBS 16136, 16138-39, 16222, 16224, 16227, 16229-31, 16233-34, 16237, 16240, 16242-44, 16249-53, 16256-60, small village S of Fugong along Salween River, 26° 48' 44.0" N, 98° 53', 10.7" E, 1,138 m.

***Japalura swinhonis*:** CAS 135110, Taiwan, Tainan.

***Japalura tricarinata*:** CAS 177639-41, China, Xizang Autonomous Region, Xigaze Prefecture, Lhasa-Kathmandu Rd, between Khasa and Nepal border. ***Japalura varcoae*:** CAS 63926-28, China, Yunnan Province, Yunan-fu.